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## EARTHQUAKES AND FAULTS IN CALIFORNIA

The recent series of earthquakes in the southern San Joaquin Valley, initiated by the severe Arvin Tehachapi earthquake of July 21, 1952 and followed by a succession of lesser aftershocks, is part of the continuing evidence of the position of California in a seismically active belt of geologically young, developing mountain ranges, valleys, and abrupt continental margins that rim the Pacific Ocean. No part of the surface of the earth is free from earthquakes but even the short period of seismograph records (just about 50 years) has been long enough to show that certain areas on the earth's surface have many times more earthquakes than have others. These areas of greatest earthquake frequency are the regions of high, actively building mountain ranges, steep continental slopes, and deep oceanic belts, one such belt rimming the entire Pacific Ocean and the other extending discontinuously from west to east through the West Indies, Mediterranean Sea, and Himalaya Mountains, and turning southeastward to join the Pacific belt in the East Indies. California and Nevada, located in the great circum-Pacific seismic belt, have had about 95 percent of the earthquakes in the United States.

Along with the rest of the margin of the Pacific Ocean, California has had a history of hundreds of more or less damaging shocks in the past century and a half. Four great earthquakes, (San Juan Capistrano, Fort Tejon, Owens Valley, and San Francisco), stand out above the rest. The San Jose Capistrano earthquake of 1812 is the earliest of the major earthquakes substantiated by good written records. Many lives were lost in the destruction of the Capistrano Mission and Santa Ynez Mission, 170 miles apart. Geologists and seismologists are inclined to believe movement along a submarine fault off the Santa Barbara coast was responsible.

The San Andreas rift, California's greatest active fault, clearly traceable for over 650 miles from Pt. Arena to the Salton Sea, has undergone repeated movement, mostly of the horizontal right-lateral type (east block moving south), and has been responsible for many earthquakes. In 1857 such an abrupt movement took place along the rift for 225 miles between Cholame Valley and San Bernardino, resulting in the Fort Tejon earthquake, felt from Fort Yuma to Sacramento.

The greatest ever recorded in California was the Owens Valley earthquake of 1872, which resulted

from movement along one of the major faults of the Sierra Nevada fault zone at the steep eastern base of the Sierra. Surface displacement was noted from Haiwee to Bishop, reaching a maximum of 20 feet horizontally and 23 feet vertically near the town of Lone Pine. The scarp is still visible north of Lone Pine.

The San Francisco earthquake of 1906 resulted from chiefly horizontal displacement along the San Andreas fault; the east block moved relatively south a maximum of 21 feet just south of Tomales Bay. Surface cracks were reported along the rift zone from upper Mattole in Humboldt County to San Juan Bautista in San Benito County.

Other less damaging shocks include the Hayward earthquakes of 1836 and 1868 (movement on the



Dust rising during aftershock, Arvin-Tehachapi earthquake, 1952.